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ENVIRONMENTAL HEALTH SERIES
Division of Water Supply
and Pollution Control

GLOSSARY

of Commonly Used

BIOLOGICAL

and RELATED TERMS

in Water and Waste

Water Control

U. S. DEPARTMENT OF HEALTH
EDUCATION AND WELFARE
Public Health Service

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Glossary Of Commonly Used Biological And Related Terms In Water And Waste Water Control

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The ENVIRONMENTAL HEALTH SERIES of reports was established to report the results of scientific and engineering studies of man's environment: The community, whether urban, suburban, or rural, where he lives, works, and plays; the air, water, and earth he uses and re-uses; and the wastes he produces and must dispose of in a way that preserves these natural resources. This SERIES of reports provides for professional users a central source of information on the intramural research activities of Divisions and Centers within the Public Health Service, and on their cooperative activities with State and local agencies, research institutions, and industrial organizations. The general subject area of each report is indicated by the two letters that appear in the publication number; the indicators are

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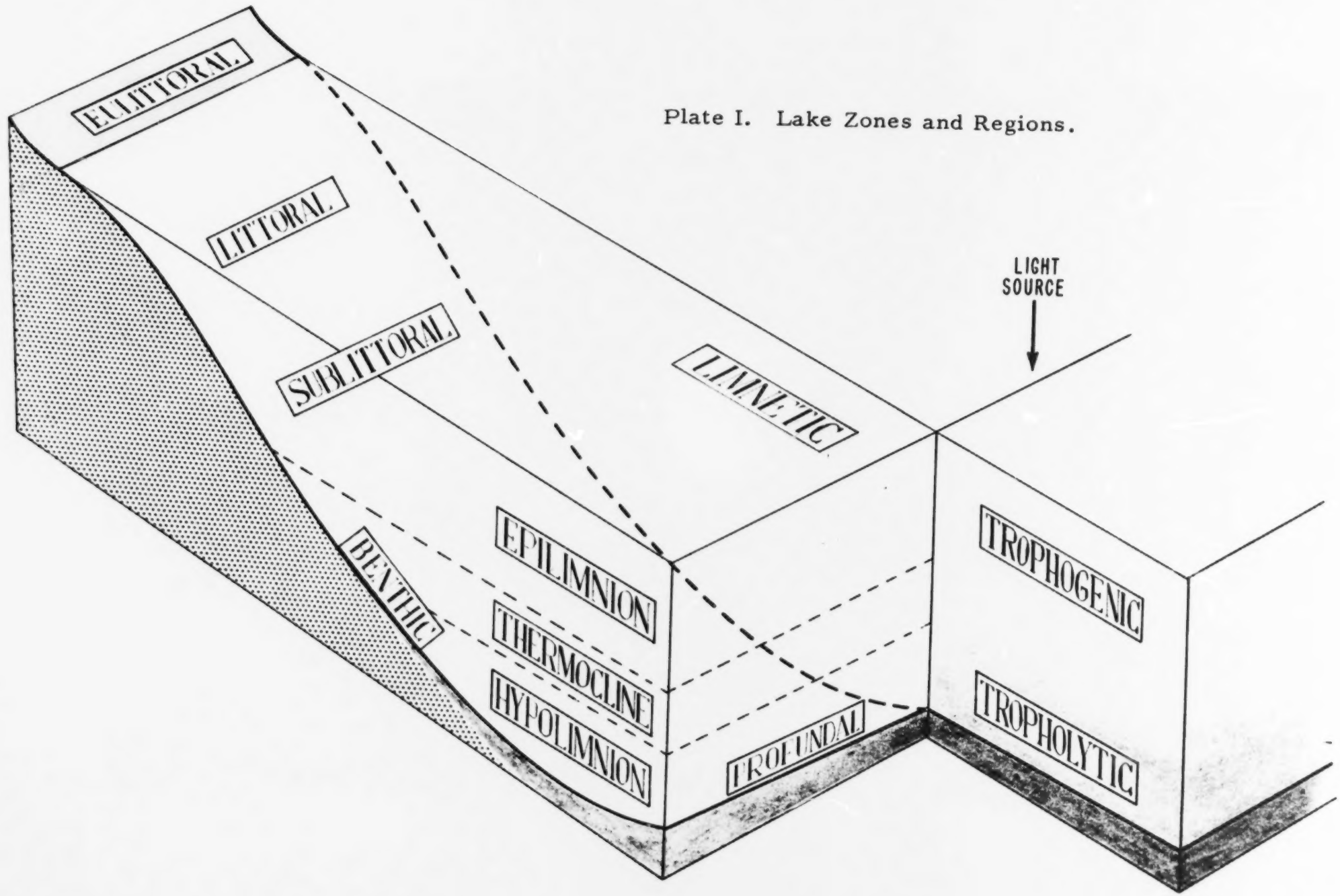
Preface

The extensive use of biologists in water supply, sewage treatment, waste water control, and water quality surveys of streams, lakes, and estuaries is of relatively recent origin. As a result, bilological terminology is often unfamiliar to many who could benefit from a more comprehensive appreciation of the investigations and possible uses of biological data.

The need for better understanding of biological terms that can be usefully applied in engineering reports of environmental investigations of water has existed for a number of years. These terms are used in introductory and advanced courses for water pollution control engineers, chemists, administrators, waterworks operators, and sewage treatment plant operators. In the GLOSSARY OF COMMONLY USED BIOLOGICAL AND RELATED TERMS IN WATER AND WASTE WATER CONTROL, we have endeavored to fulfill this need. This glossary contains selected terms defined so that those persons not intimately acquainted with the biological field will have a more precise understanding of them. Its purpose is to serve as an introduction to the aquatic biologist's technical terminology. Diligent use should foster a deeper appreciation of the science, permit a better understanding of many technical reports and papers, and promote the further cooperation that is so necessary among the associated disciplines of water pollution control.

THE AUTHORS

Plate I. Lake Zones and Regions.



Glossary Of Commonly Used Biological And Related Terms In Water And Waste Water Control

ACCLIMATION - The process of adjusting to a change in an environment.

ADAPTATION - A change in the structure, form, or habit of an organism resulting from a change in its environment.

AEROBIC ORGANISM - An organism that thrives in the presence of oxygen.

ALGAE (Alga) - Simple plants, many microscopic, containing chlorophyll. Most algae are aquatic and may produce a nuisance when conditions are suitable for prolific growth.

ALGICIDE - A specific chemical highly toxic to algae. Algicides are often applied to water to control nuisance algal blooms.

ALGOLOGY - The study of algae.

AMPHIBIOUS ORGANISM - An organism adapted for life on land or in water.

AMPHIPODS (See Scuds.)

ANADROMOUS FISHES - Fishes that spend a part of their life in the sea or lakes, but ascend rivers at more or less regular intervals to spawn. Examples are sturgeon, shad, salmon, trout, and striped bass.

ANAEROBIC ORGANISM - An organism that thrives in the absence of oxygen.

ANNELIDS

ANNELIDS - Segmented worms, as distinguished from the non-segmented roundworms and flatworms. Most are marine; however, many live in soil or fresh water. Aquatic forms may establish dense populations in the presence of rich organic deposits. Common examples of segmented worms are earthworms, sludgeworms, sandworms, and leeches.

X2

AQUATIC SOW BUGS (Isopoda) - Macroscopic aquatic crustaceans that are flat from top to bottom. Most are marine and estuarine. They are scavengers that live secretively under rocks and among vegetation and debris.

ASSIMILATION - The transformation of absorbed nutrients into body substances.

AUTOTROPHIC ORGANISM - An organism capable of constructing organic matter from inorganic substances.

BENTHIC REGION - The bottom of a body of water. This region supports the benthos, a type of life that not only lives upon but contributes to the character of the bottom. (See Plate I.)

BENTHOS - Aquatic bottom-dwelling organisms. These include: (1) sessile animals, such as the sponges, barnacles, mussels, oysters, some of the worms, and many attached algae; (2) creeping forms, such as insects, snails, and certain clams; and (3) burrowing forms, which include most clams and worms.

BIO-ASSAY - A determination of the concentration of a given material by comparison with a standard preparation; or the determination of the quantity necessary to affect a test animal under stated laboratory conditions.

BIOMASS - The weight of all life in a specified unit of environment or an expression of the total mass or weight of a given population, both plant and animal.

BIOTA - All living organisms of a region.

BIVALVE - An animal with a hinged two-valve shell; examples are the clam and oyster.

BLACK FLY LARVAE (Simuliidae) - Aquatic larvae that produce a silk-like thread with which they anchor themselves to objects in swiftrunning waters. With a pair of fan-shaped structures, a larva of this type produces a current of water toward its mouth and from this water ingests smaller organisms. The adults are terrestrial; females feed on the blood of higher animals.

X9

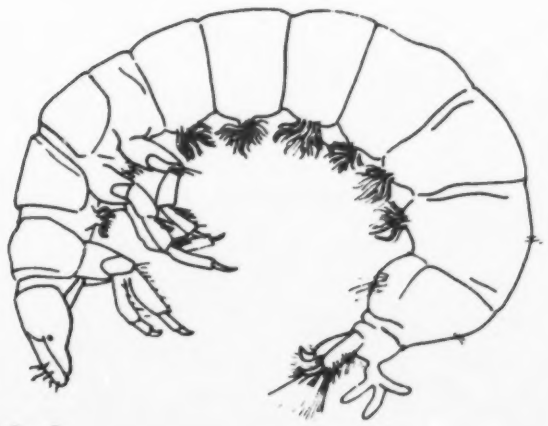
BLOODWORMS (Tendipedidae = Chironomidae) - Cylindrical elongated midge larvae with pairs of prolegs on both the first thoracic and last abdominal segments. Although many species are blood-red in color, some are pale yellowish, yellowish red, brownish, pale greenish yellow, and green. Most feed on diatoms, algae, tissues of aquatic plants, decaying organic matter, and plankton. Some are associated with rich organic deposits. Midge larvae are important as food for fishes.

X3

BLOOM - A readily visible concentrated growth or aggregation of plankton (plant and animal).

BLUE-GREEN ALGAE - A group of algae with a blue pigment, in addition to the green chlorophyll. A stench is often associated with the decomposition of dense blooms of blue-green algae in fertile lakes.

CADDISFLY LARVAE

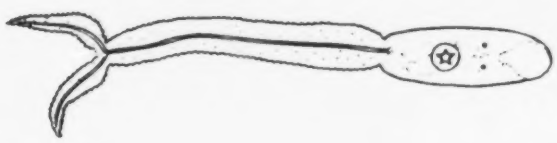


X2.2

CADDISFLY LARVAE (Trichoptera) - Aquatic larvae found in a variety of habitats. Many build cases of small rocks, shells, wood, and plants and feed upon plant tissue and small animals captured in nets they place near the case entrance. Adults have well-developed wings but no functional mouth parts. Eggs are deposited on sticks or stones in water.

CATADROMOUS FISHES - Fishes that feed and grow in fresh water, but return to the sea to spawn. The best-known example is the American eel.

CENTRARCHIDAE (See Sunfish.)



X170

CERCARIA - The tailed, immature stage of a parasitic flatworm.

CHARA - A family of algae possessing cylindrical whorled branches. The plants grow only in hard water, from the bottom, and usually have a coating of lime that can be felt between the fingers. Chara should not be confused with submerged higher aquatic plants.

CHIRONOMIDAE (See Bloodworms.)

CHLOROPHYLL - The green coloring matter in plants, partly responsible for photosynthesis.

CLEAN WATER ASSOCIATION - An association of organisms, usually characterized by many different kinds (species). These associations occur in natural unpolluted environments. Because of competition, predation, etc., however, relatively few individuals represent any particular species.

COARSE OR ROUGH FISH - Those species of fish considered to be of poor fighting quality when taken on tackle, and of poor food quality. These fish may be undesirable in a given situation, but at times may be classified differently, depending upon their usefulness. Examples include carp, goldfish, gar, sucker, bowfin, gizzard shad, goldeneye, mooneye, and certain kinds of catfish.

COELENTERATE - A group of aquatic animals that have gelatinous bodies, tentacles, and stinging cells. These animals occur in great variety and abundance in the sea and are represented in fresh water by a few types. Examples are hydra, corals, sea-anemones, and jellyfish.

COLD-BLOODED ANIMALS (Poikilothermic Animals) - Animals that lack a temperature-regulating mechanism that offsets external temperature changes. Their temperature fluctuates to a large degree with that of their environment. Examples are fish, shellfish, and aquatic insects.

CONSUMERS - Organisms that consume solid particles of organic food material. Protozoa are consumers.

CORYDALIDAE (See Hellgrammites.)

CRUSTACEA - Mostly aquatic animals with rigid outer coverings, jointed appendages, and gills. Examples are crayfish, crabs, barnacles, water fleas, and sow bugs.

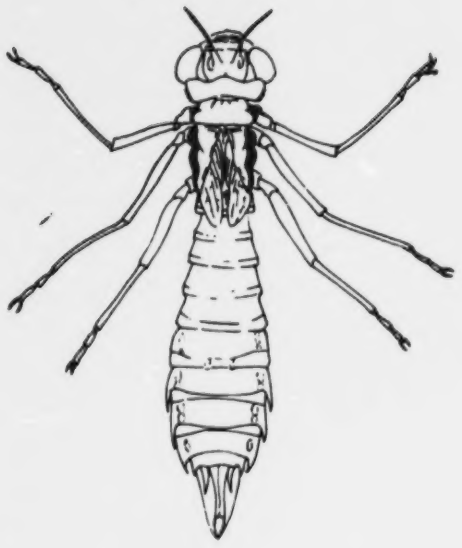
DAMSELFLY NYMPH (Odonata) - The immature damselfly. This aquatic insect nymph has an enormous grasping lower jaw and three flat leaf-like gill plates that project from the posterior end of the abdomen. Nymphs live most of their lives searching for food among submerged plants in still water; a few cling to plants near the current's edge; and a very few cling to rocks in flowing water. The carnivorous adults capture lesser insects on the wing.

X2

DAPHNIA (See Water Fleas.)

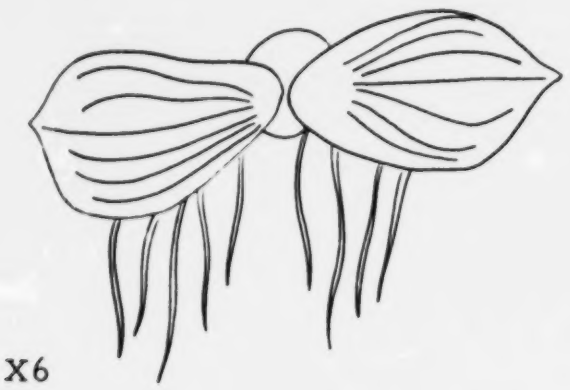
DERMATITIS

DERMATITIS - Any inflammation of the skin. One type may be caused by the penetration beneath the skin of a cercaria found in water; this form of dermatitis is commonly called "swimmers' itch."



X1

DRAGONFLY NYMPH (Odonata) - The immature dragonfly. This aquatic insect nymph has gills on the inner walls of its rectal respiratory chamber. It has an enormous grasping lower jaw that it can extend forward to a distance several times the length of its head. Although many of these nymphs climb among aquatic plants, most sprawl in the mud where they lie in ambush to await their prey. The carnivorous adults capture lesser insects on the wing.



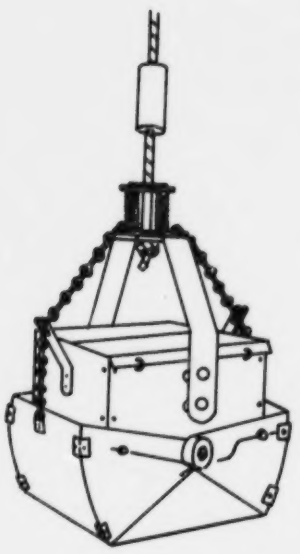
X6

DUCKWEED - a free-floating aquatic flowering plant possessing fronds resembling tiny green leaves. Small roots beneath the leaves easily distinguish this plant from algae.

DYSTROPHIC LAKES - Brown-water lakes with a very low lime content and a very high humus content. These lakes often lack nutrients.

ECOLOGY - The science of the interrelations between living organisms and their environment.

EKMAN DREDGE - The standard spring-loaded bottom sampler used for sampling soft bottoms. The body of the dredge consists of a square box of sheet brass (6 by 6, 9 by 9, or 12 by 12 inches). The lower opening of this box is closed by a pair of strong brass jaws that snap shut when the springs are released. When the jaws are fully pulled apart, the bottom of the dredge is open.



EMERGENT AQUATIC PLANTS - Plants that are rooted at the bottom but project above the water surface. Examples are cattails and bulrushes.

ENTOMOLOGIST - A specialist in the study of insects.

ENVIRONMENT - The sum of all external influences and conditions affecting the life and the development of an organism.

EPHEMERIDAE (See Mayfly Naiads.)

EPILIMNION - That region of a body of water that extends from the surface to the thermocline and does not have a permanent temperature stratification. (See Plate I.)

ERISTALIS (See Rat-Tailed Maggot.)

ESTUARY - Commonly an arm of the sea at the lower end of a river. Estuaries are often enclosed by land except at channel entrance points.

EULITTORAL ZONE - The shore zone of a body of water between the limits of water-level fluctuation. (See Plate I.)

EUPHOTIC ZONE - The lighted region that extends vertically from the water surface to the level at which photosynthesis fails to occur because of ineffective light penetration.

EURYTOPIC ORGANISMS - Organisms with a wide range of tolerance to a particular environmental factor. Examples are sludgeworms and bloodworms.

EUTROPHICATION - The intentional or unintentional enrichment of water.

EUTROPHIC WATERS

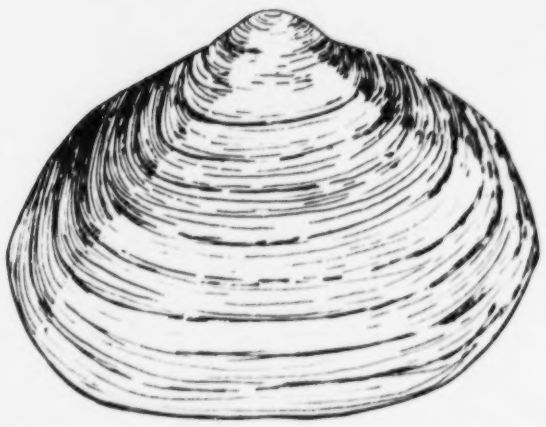
EUTROPHIC WATERS - Waters with a good supply of nutrients. These waters may support rich organic productions, such as algal blooms.

FACULTATIVE AEROBE - An organism that although fundamentally an anaerobe can grow in the presence of free oxygen.

FACULTATIVE ANAEROBE - An organism that although fundamentally an aerobe can grow in the absence of free oxygen.

FALL OVERTURN - A physical phenomenon that may take place in a body of water during the early autumn. The sequence of events leading to fall overturn include: (1) cooling of surface waters, (2) density change in surface waters producing convection currents from top to bottom, (3) circulation of the total water volume by wind action, and (4) vertical temperature equality, 4°C. The overturn results in a uniformity of the physical and chemical properties of the water.

FAUNA - The entire animal life of a region.



X3.5

FINGERNAIL CLAMS (Sphaeriidae) - Small clams, usually less than one-inch in diameter, that give live birth to shelled young.

FLATWORMS (Platyhelminthes) - Nonsegmented worms, flattened from top to bottom. In all but a few of the flatworms complete male and female reproductive systems are present in each individual. Most flatworms are found in water, moist earth, or as parasites in plants and animals.

FLOATING AQUATIC PLANTS - Plants that wholly or in part float on the surface of the water. Examples are water lilies, water shields, and duckweeds.

FLORA - The entire plant life of a region.

FRY (Sac Fry) - The stage in the life of a fish between the hatching of the egg and the absorption of the yolk sac. From this stage until they attain a length of 1 inch the young fish are considered advanced fry.

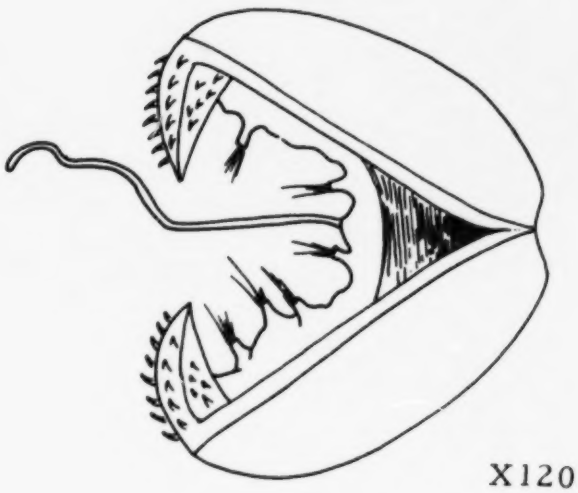
X2.5

FUNGI (Fungus) - Simple or complex organisms without chlorophyll. The simpler forms are one-celled; the higher forms have branched filaments and complicated life cycles. Examples of fungi are molds, yeasts, and mushrooms.

FUNGICIDE - Substances or a mixture of substances intended to prevent, destroy, or mitigate any fungi.

GAME FISH - Those species of fish considered to possess sporting qualities on fishing tackle. These fish may be classified as undesirable, depending upon their usefulness. Examples of fresh-water game fish are salmon, trout, grayling, black bass, muskellunge, walleye, northern pike, and lake trout.

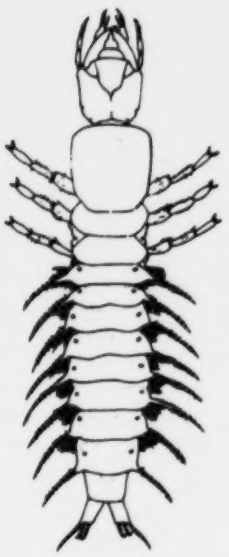
GLOCHIDIUM - The larvae of fresh-water mussels. These larvae are temporary parasites that live on the gills, fins, and general body surface of many fish.



X120

GREEN ALGAE - Algae that have pigments similar in color to those of higher green plants. Common forms produce algal mats or floating "moss" in lakes.

HELLGRAMMITES



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HELLGRAMMITES (Corydalidae) - Dobsonfly larvae. Full-grown larvae are 2 to 3 inches in length; they have a dark-brown rough-looking skin, large jaws, and posterior hooks. The aquatic larval stage lasts 2 to 3 years. They are secretive and predaceous, living under rocks and debris in flowing water. These larvae are considered one of the finest live baits by fishermen. Pupation occurs on shore, under rocks and debris near the stream edge. The terrestrial adults are short lived.

HERBICIDE - Substances or a mixture of substances intended to control or destroy any vegetation.

HERBIVORE - An organism that feeds on vegetation.

HETEROTROPHIC ORGANISMS - Organisms that are dependent on organic matter for food.

HIGHER AQUATIC PLANTS - Flowering aquatic plants. (These are separately categorized herein as Emergent, Floating, and Submerged Aquatic Plants.)

HIRUDINEA (See Leeches.)

HOLOMICTIC LAKES - Lakes that are completely circulated to the bottom at time of winter cooling.

HYPOLIMNION - The region of a body of water that extends from the thermocline to the bottom of the lake and is removed from surface influence. (See Plate I.)

ICTHYOLOGIST - A specialist in the study of fishes.

INSECTICIDE - Substances or a mixture of substances intended to prevent, destroy, or repel insects.

INVERTEBRATES - Animals without backbones.

ISOPODA (See Aquatic Sow Bugs.)

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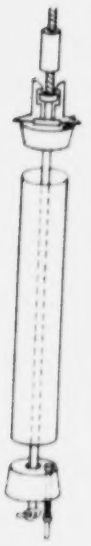
KEMMERER WATER SAMPLER - An instrument designed to collect a known volume of water from a predetermined depth. The sampler construction essentially consists of a brass cylinder with closable rubber stoppers on each end. It is suspended in the water with a rope; closure is accomplished when a brass messenger, which is sent down the rope, strikes a tripping device.



LD_{50} (See Median Lethal Dose.)

LEECHES (Hirudinea) - Segmented worms, flat from top to bottom, with terminal suckers that are used for attachment and locomotion. Various species may be parasites, predators, or scavengers; most are aquatic.

X1

LENITIC OR LENTIC ENVIRONMENT - Standing water and its various intergrades. Examples of lenitic environments are lakes, ponds, and swamps.

LIFE CYCLE - The series of stages in the form and mode of life of an organism, i.e., the stages between successive recurrences of a certain primary stage such as the spore, fertilized egg, seed, or resting cell.

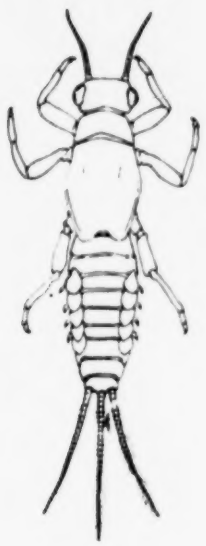
LIMNETIC ZONE - The open-water region of a lake. This region supports plankton and fish as the principal plants and animals. (See Plate I.)

LIMNOLOGY - The study of the physical, chemical, and biological aspects of inland waters.

LITTORAL ZONE - The shoreward region of a body of water. (See Plate I.)

LOTIC ENVIRONMENT - Running waters, such as streams or rivers.

MACROORGANISMS - Plant, animal, or fungal organisms visible to the unaided eye.



X2.7

MAYFLY NAIADS (Ephemeridae) - The immature mayfly. Paired gills are attached to the upper surface of the outer edge of some or all of the first seven abdominal segments. The abdomen terminates in three, rarely two, slender tails. Mouth parts are particularly suited for raking diatoms and rasping decaying plant stems. The terrestrial adults lack functional mouth parts and live only a few hours.

MEDIAN LETHAL DOSE (LD_{50}) - The dose lethal to 50 percent of a group of test organisms for a specified period. The dose material may be ingested or injected.

MEDIAN TOLERANCE LIMIT (TL_m) - The concentration of the tested material in a suitable diluent (experimental water) at which just 50 percent of the test animals are able to survive for a specified period of exposure.

MEROMICTIC LAKES - Lakes in which dissolved substances create a gradient of density differences in depth, preventing complete mixing or circulation of the water.

MICROORGANISM - Any minute organism invisible or barely visible to the unaided eye.

MINNOWS (Cyprinidae) - The family of fishes including such forms as shiners, dace, and carp.

MOLLUSCICIDE - Substances or a mixture of substances intended to destroy or control snails. Copper is commonly used.

MOLLUSK (Mollusca) - A large animal group including those forms popularly called shellfish (but not including crustaceans). All have a soft unsegmented body protected in most instances by a calcareous shell. Examples are snails, mussels, clams, and oysters.

MOSS - Any bryophytic plant characterized by small, leafy, often tufted stems bearing sex organs at the tips.

MOTILE - Exhibiting or capable of spontaneous movement.

MUSSEL POISON (See Shellfish Poison.)

MYCOLOGY - The study of fungi.

NEKTON - Swimming organisms able to navigate at will.

NEMATODA - Unsegmented roundworms or threadworms. Some are free living in soil, fresh water, and salt water; some are found living in plant tissue; others live in animal tissue as parasites.

NEUSTON - Organisms resting or swimming on the surface film of the water.

OCEANOGRAPHY - The study of the physical, chemical, geological, and biological aspects of the sea.

OCULAR MICROMETER - A scaled glass disc that, fitted on the diaphragm of a microscope ocular, is used in making microscopic measurements.

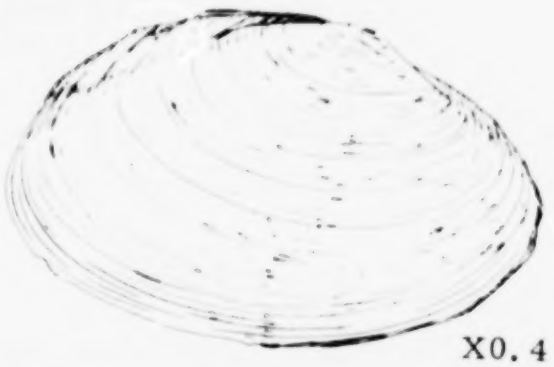
OLIGOTROPHIC WATERS - Waters with a small supply of nutrients; thus, they support little organic production.

ORGANIC DETRITUS - The particulate remains of disintegrated plants and animals.

OXYGEN-DEBT - A phenomenon that occurs in an organism when available oxygen is inadequate to supply the respiratory demand. During such a period the metabolic processes result in the accumulation of breakdown products that are not oxidized until sufficient oxygen becomes available.

PARASITE - An organism that lives on or in a host organism from which it obtains nourishment at the expense of the latter during all or part of its existence.

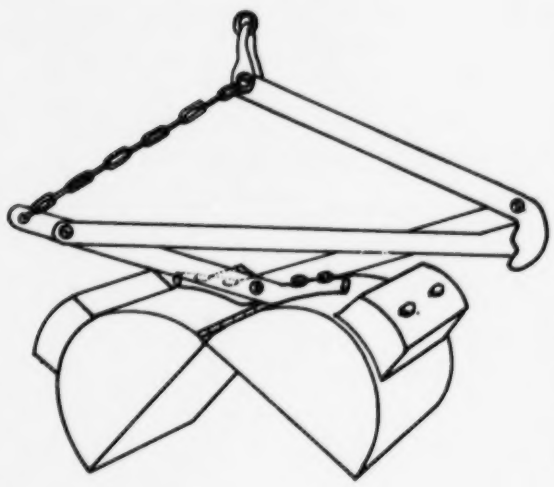
PEARL BUTTON CLAMS (Unionidae) - Large fresh-water clams. The shell has a thick mother-of-pearl layer. The thick-shelled members of this family are utilized in the manufacturing of buttons.



X0.4

PELAGIC ZONE - The free-water region of a sea. (Pelagic refers to the sea, limnetic refers to bodies of fresh water.)

PERIPHYTON - The association of aquatic organisms attached or clinging to stems and leaves of rooted plants or other surfaces projecting above the bottom.



PETERSEN DREDGE - A sturdy steel or iron dredge widely used for taking samples from hard bottoms, such as sand, gravel, marl, clay, and similar materials. It is so constructed that, both by its own weight and by the leverage exerted by its closing mechanism, it bites its way into hard bottoms deep enough to secure a satisfactory sample. The area sampled varies from 0.6 to 0.9 square foot, depending on individual dredge construction.

PHOTOSYNTHESIS - The process by which simple sugars and starches are produced from carbon dioxide and water by living plant cells, with the aid of chlorophyll and in the presence of light.

PHOTOTROPISM - Movement in response to a light gradient; for example, a movement towards light is positive phototropism.

PHYTOPLANKTON - Plant plankton that live unattached in water.

PISCICIDE - Substances or a mixture of substances intended to destroy or control fish populations.

PLANKTON (Plankter) - Organisms of relatively small size, mostly microscopic, that have either relatively small powers of locomotion or that drift in the water with waves, currents, and other water motion.

PLANKTON NET - A cloth net, usually coneshaped, used to collect plankton. Plankters separated from water by means of a net are generally referred to as net plankton and represent only a fraction of the total population. Silk bolting cloth is regarded as the best material for plankton nets.

PLATYHELMENTHES (See Flatworms.)

PLECOPTERA (See Stonefly Nymphs.)

POIKILOTHERMIC ANIMALS (See Cold-Blooded Animals.)

POOL ZONE - The deep-water area of a stream, where the velocity of current is reduced. The reduced velocity provides a favorable habitat for plankton. Silt and other loose materials that settle to the bottom of this zone are favorable for burrowing forms of benthos.

PORIFERA (See Sponges.)

POTAMOLOGY - The study of the physical, chemical, geological, and biological aspects of rivers.

PRODUCERS - Organisms that synthesize their own organic substance from inorganic substances; for example, plants.

PRODUCTION (Productivity) - A time-rate unit of the total amount of organisms grown.

PROFUNDAL ZONE - The deep- and bottom-water area beyond the depth of effective light penetration. All of the lake floor beneath the hypolimnion. (See Plate I.)

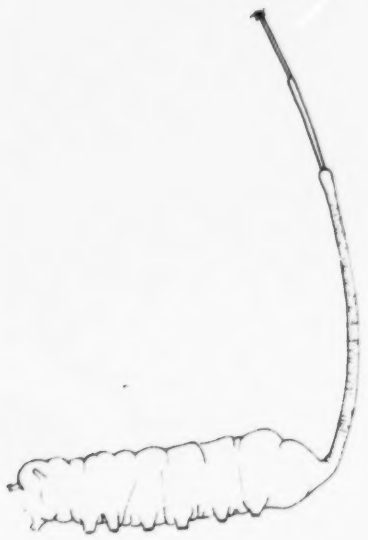
PROTOZOA - Organisms consisting either of a single cell or of aggregates of cells, each of which performs all the essential functions in life. They are mostly microscopic in size and largely aquatic.

PROTOZOOLOGIST - A specialist in the study of protozoa.

PSYCHODA (See Sewage Fly Larvae.)

RAPIDS ZONE - The shallow-water area of a stream, where velocity of current is great enough to keep the bottom clear of silt and other loose materials, thus providing a firm bottom. This zone is occupied largely by specialized benthic or periphytic organisms that are firmly attached to or cling to a firm substrate.

RAT-TAILED MAGGOT



X2.3

RAT-TAILED MAGGOT (Tubifera = Eristalis) - An aquatic fly maggot usually found in foul, often septic, water. It possesses a three-segmented, telescopic air tube that extends through the water surface, enabling the maggot to breathe from the atmosphere. The larvae live on decayed organic material.

REDD - A type of fish-spawning area associated with running water and clean gravel. Fish moving upstream sequentially dig a pocket, deposit and fertilize eggs, and then cover the spawn with gravel from the next upstream pocket. Fishes that utilize this type of spawning area include some trouts, salmons, and minnows.

RED TIDE - A visible red-to-orange coloration of an area of the sea caused by the presence of a bloom of certain "armored" flagellates.

REDUCERS - Organisms that digest food outside the cell wall by means of enzymes secreted for this purpose. Soluble food is then absorbed into the cell and reduced to a mineral condition. Examples are fungi, bacteria, protozoa, and nonpigmented algae.

RHEOTROPISM - Movement in response to the stimulus of a current gradient in water.

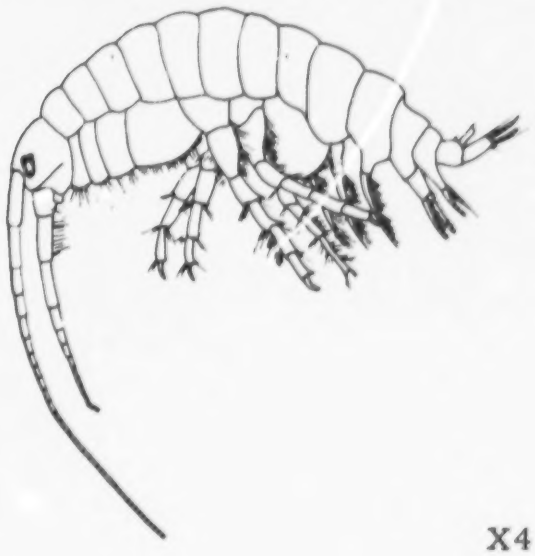
RIFFLE - A section of a stream in which the water is usually shallower and the current of greater velocity than in the connecting pools; a riffle is smaller than a rapid and shallower than a chute.

ROTIFERS (Rotatoria) - Microscopic aquatic animals, primarily free-living fresh-water forms that occur in a variety of habitats. Approximately 75 percent of the known species occur in the littoral zone of lakes and ponds. The more dense populations are associated with a substrate of submerged aquatic vegetation. Most forms ingest fine organic detritus for food, whereas others are predaceous.

SAC FRY (See Fry.)

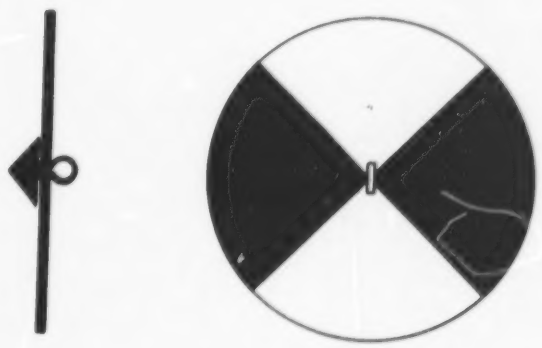
SCAVENGER - An organism that feeds upon decomposing organic matter.

SCUDS (Amphipods) - Macroscopic aquatic crustaceans that are laterally compressed. Most are marine and estuarine. Dense populations are associated with aquatic vegetation. Great numbers are consumed by fish.



X4

SECCHI DISK - A device used to measure visibility depths in water. The upper surface of a circular metal plate, 20 centimeters in diameter, is divided into four quadrants and so painted that two quadrants directly opposite each other are black and the intervening ones white. When suspended to various depths of water by means of a graduated line, its point of disappearance indicates the limit of visibility.



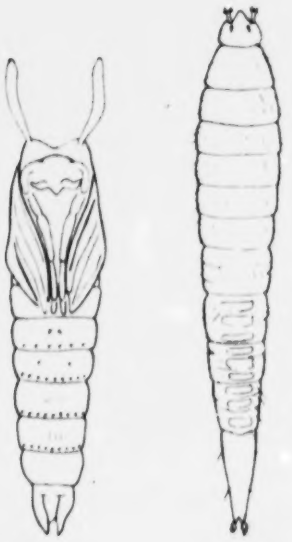
SEDGWICK-RAFTER CONCENTRATION METHOD - A procedure for the quantitative determination of plankton in water by use of a special funnel, a certain grade of sand, and bolting-cloth discs.

SEDGWICK-RAFTER COUNTING CELL - A plankton-counting cell consisting of a brass or glass receptacle 50 by 20 by 1 millimeter sealed to a 1- by 3-inch glass microscope slide. A rectangular cover glass large enough to cover the whole cell is required. The cell has a capacity of exactly 1 milliliter.

SEICHE - A form of periodic current system, described as a standing wave, in which some stratum of the water in a basin oscillates about one or more nodes.

SESSILE ORGANISMS - Organisms that sit directly on a base without support, attached or merely resting unattached on a substrate.

SESTON - The living and nonliving bodies of plants or animals that float or swim in the water.

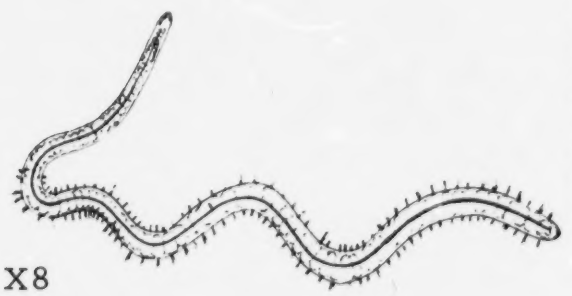


X14 X8

SEWAGE FLY LARVAE (Psychoda) - A grayish-white, cylindrical larvae with hardened dorsal plates on the posterior segments. Larvae and pupae usually occur in filter beds of sewage treatment plants, in foul water, and in decaying organic matter. The terrestrial adults are small, less than 4 millimeters long, and moth-like, and often are a nuisance in areas near trickling-filter plants. The sewage fly has a 2-week life cycle.

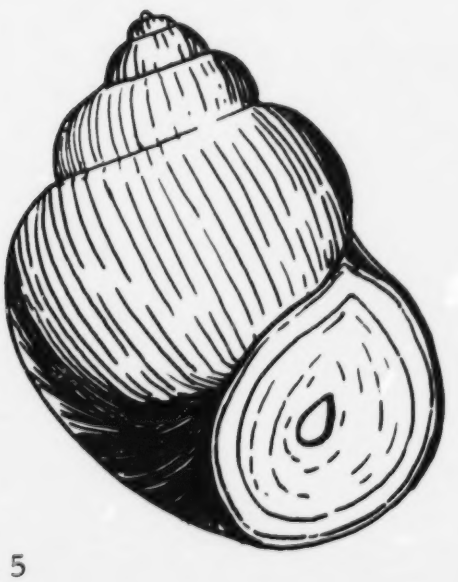
SHELLFISH POISON (Mussel Poison) - A poison present in shellfish that have fed upon certain small marine phytoplankters in which the toxic principles exist. The shellfish concentrates the poison without harmful effects to itself, but man is poisoned through consumption of the toxic flesh.

SIMULIIDAE (See Black Fly Larvae.)



X8

SLUDGEWORMS (Tubificidae) - Tolerant, aquatic, segmented worms that exhibit marked population increases in streams and rivers polluted with organic decomposable wastes.



X2.5

SNAIL - An organism that typically possesses a coiled shell and crawls on a single muscular foot. Air-breathing snails, called pulmonates, do not have gills but obtain oxygen through a "lung" or pulmonary cavity. At variable intervals most pulmonate snails come to the surface of the water for a fresh supply of air. Gill-breathing snails possess an internal gill through which dissolved oxygen is removed from the surrounding water.

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SPECIES (both singular and plural) - a natural population or group of populations that transmit specific characteristics from parent to offspring. They are reproductively isolated from other populations with which they might breed. Populations usually exhibit a loss of fertility when hybridizing.

SPHAERIIDAE (See Fingernail Clams.)

SPHAEROTILUS - A slime-producing, nonmotile, sheathed, filamentous, attached bacterium. Great masses are often broken from their "holdfasts" by currents and are carried floating downstream in gelatinous flocks.

SPONGES (Porifera) - One of the sessile animals that fasten to piers, pilings, shells, rocks, etc. Most live in the sea.

SPORE - The reproductive cell of a protozoan, fungus, alga, or bryophyte. In bacteria, spores are specialized resting cells.

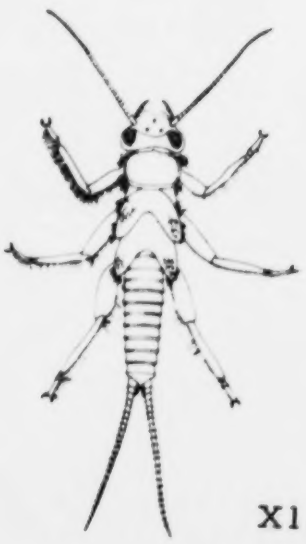
SPRING OVERTURN - A physical phenomenon that may take place in a body of water during the early spring. The sequence of events leading to spring overturn include: (1) melting of ice cover, (2) warming of surface waters, (3) density change in surface waters producing convection currents from top to bottom, (4) circulation of the total water volume by wind action, and (5) vertical temperature equality, 4°C. The overturn results in a uniformity of the physical and chemical properties of the water.

STAGE MICROMETER - A standardized, accurately ruled scale, mounted on a glass slide. It is used to calibrate a microscope.

STANDING CROP - The biota present in an environment on a selected date.

STENOTOPIC ORGANISMS - Organisms with a narrow range of tolerance for a particular environmental factor. Examples are trout, stonefly nymphs, etc.

STONEFLY NYMPHS (Plecoptera) - Immature stoneflies. The nymphs live approximately 1 year in the clean, rapidly moving water required for their development. They live under rocks, in cracks of submerged logs, and in mats of debris. Most stonefly nymphs are vegetarians; however, a number are predaceous and feed upon small insects and other aquatic invertebrates. The adults live only a few weeks; they are secretive creatures, resting on stones and sticks along the banks of streams.

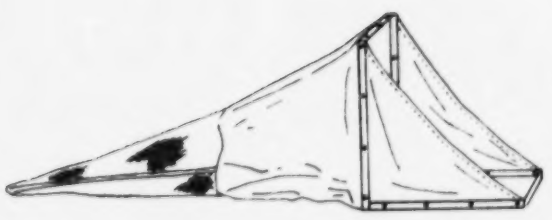


X1.5

SUBLITTORAL ZONE - The part of the shore from the lowest water level to the lower boundary of plant growth. (See Plate I.)

SUBMERGED AQUATIC PLANT - A plant that is continuously submerged beneath the surface of the water. Examples are the pondweed and coontail.

SUNFISH (Centrarchidae) - Carnivorous fresh-water fish, all of which are spring spawners. The females utilize shallow depressions excavated by the males for nests; later the males guard the eggs and the young. Like other essentially carnivorous fish, the young feed first on microscopic organisms and later on invertebrates and vertebrates. Members of this family are generally divided into the following groups: (1) largemouth and smallmouth black bass, (2) crappies and the round sunfish, (3) true sunfish and rock bass, and (4) Sacramento perch of the Pacific Coast.



SURBER STREAM BOTTOM SAMPLER - A compact, lightweight, portable, quantitative bottom sampler especially suitable for sampling organisms from the stone or gravel bottoms of shallow streams possessing a strong current. Construction consists of two square metal frames of equal size hinged together. One frame carries a net of extra heavy bolting cloth; the other, when in working position, encloses the sampling area (1 square foot). Dislodged organisms are carried into the downstream net.

SWIMBLADDER - An internal membranous gas-filled organ of many fishes. It may function as a hydrostatic or sense organ, or as part of the respiratory system.

SWIMMERS' ITCH - A rash produced on bathers by a parasitic flatworm in the cercarial stage of its life cycle. The organism is killed by the human body as soon as it penetrates the skin; however, the rash may persist for a period of about 2 weeks.

SYMBIOSIS - Two organisms of different species living together, one or both of which may benefit and neither is harmed.

SYSTEMATICS - The science of organism classification.

TENDIPEDIDAE (See Bloodworms.)

THERMOCLINE - That layer in a body of water where the temperature difference is greatest per unit of depth. It is the layer in which the drop in temperature equals or exceeds 1°C (1.8°F) per meter (39.37 inches). (See Plate I.)

TL_m (See Median Tolerance Limit.)

TOLERANT ASSOCIATION - An association of organisms capable of withstanding adverse conditions within the habitat. It is usually characterized by a reduction in species (from a clean water association) and an increase in individuals representing a particular species.

TRICHOPTERA (See Caddisfly Larvae.)

TROPHOGENIC REGION - The superficial layer of a lake in which organic production from mineral substances takes place on the basis of light energy. (See Plate I.)

TROPHOLYTIC REGION - The deep layer of a lake, where organic dissimilation predominates because of light deficiency. (See Plate I.)

TUBIFERA (See Rat-Tailed Maggot.)

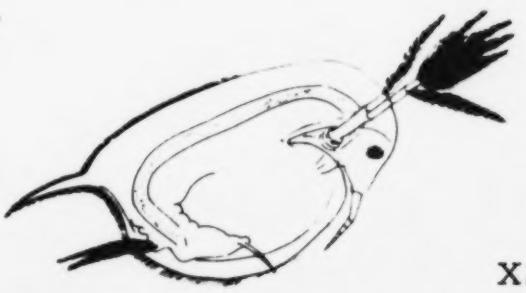
TUBIFICIDAE (See Sludgeworms.)

UNIONIDAE (See Pearl Button Clams.)

VERTEBRATE - Animals with backbones.

WARM- AND COLD-WATER FISH - Warm-water fish include black bass, sunfish, catfish, gar, and others; whereas cold-water fish include salmon and trout, whitefish, miller's thumb, and blackfish. The temperature factor determining distribution is set by adaptation of the eggs to warm or cold water.

WATERFLEAS (Daphnia) - Mostly microscopic swimming crustaceans, often forming a major portion of the zooplankton population. The second antennae are very large and are used for swimming.



X25

WHIPPLE OCULAR MICROMETER

WHIPPLE OCULAR MICROMETER - A glass disc, marked with squares, that fits into a microscope ocular and is used to determine microscopic field areas for counting plankton.

ZOOGLEA - Bacteria embedded in a jelly-like matrix formed as the result of metabolic activities.

ZOOPLANKTON - Protozoa and other animal microorganisms living unattached in water. These include small crustacea, such as daphnia and cyclops.

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